

Group Differences in Standardized Testing and Social Stratification

WAYNE J. CAMARA and
AMY ELIZABETH SCHMIDT

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Wayne J. Camara is executive director of research at the College Board.

Amy Elizabeth Schmidt is assistant research scientist at the College Board.

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Abstract

To illustrate the pervasiveness of score differences by racial/ethnic groupings, as well as by socioeconomic status, multiple measures of educational achievement were examined. In addition to examining differences in the scores on high-stakes admission tests (e.g., SAT[®], ACT[™], GRE[®], GMAT[®], MCAT[®], LSAT[®]) and other standardized measures (e.g., NAEP, NELS), differences in academic preparation, high school grades, class rank and performance on Advanced Placement Program[®] (AP[®]) Examinations were also investigated. Subsequent differences on important educational outcomes such as college course grades, overall college GPA, and graduation rates were examined as well, particularly in relation to how well measures such as the SAT I, high school grades, class rank, and the quality of high school courses completed are used to predict these outcomes.

Results indicate that the score gaps that are observed in admission tests among members of different racial and ethnic groups and different socioeconomic groups are also found in other standardized tests and in other measures of educational attainment. It is hypothesized that these differences are a powerful illustration of an important social problem: inequitable access to high-quality education. Programs that are attempting to address these inequalities, as well as the need for further research efforts, are also discussed.

Introduction

Large-scale assessments have been criticized for a variety of reasons over the years. One of the most enduring and often-repeated criticisms is that there are consistent and substantial score differences between minority and nonminority test-takers (Bronner, 1997; Jencks and Phillips, 1998; Sacks, 1997). Persistent score differences among racial and ethnic groups have been very troubling and have led to charges of test bias. Recently large-scale assessments have come under fire for another reason: persistent score differences by socioeconomic status (SES). However, it should not be surprising that, when individuals are grouped in various ways that are related to differential educational opportunities, these groups score differently on tests such as the SAT I (Widaman, February 5, 1998). It is important to note that different mean scores on a test or any other measure are not necessarily an index of bias: the more important issue for high-stakes assessments is whether there is any differential predictive ability among groups.

This paper will examine group differences on standardized admission tests and compare these to differences on other standardized tests as well as other measures and indicators of educational achievement, such as academic preparation, high school grades, class rank, and performance on AP Examinations. We will also examine differences on two types of educational outcomes: (1) educational attainment, such as college graduation, and (2) academic achievement, such as course grades and grade-point average (GPA). Measures such as the SAT I, high school grades, high school rank, and the quality of high school courses completed are used to predict academic performance in college. Do differences between groups on these predictors correspond to similar differences in the criteria used to determine college performance? Do group differences in predictors mirror differences in performance? If test fairness is best conceived as comparable validity for all groups, as Cole and Willingham suggest (1997), then these are the key questions to ask in assessing fairness claims for tests that are designed to predict future performance.

Group Differences in Standardized Tests

Differences in Admission Tests

There are substantial differences among groups in mean scores on standardized tests. Table 1 illustrates the mean ethnic and racial group differences for several prominent standardized tests.¹

Standardized differences are used to compare white test-takers to other ethnic and racial groups in standard deviation units. These group differences appear fairly consistent across standardized admission tests, with the largest gaps between white and African-American test-takers, followed by Hispanic test-takers. With only two exceptions, Asian Americans' mean test performance is nearly identical to that of whites. The exceptions occur on SAT I verbal, where Asian Americans score about one-quarter standard deviation unit lower than whites, and (GRE) Quantitative, where they exceed the performance of whites by nearly one-half a standard deviation unit. Of course, each of these tests is administered to self-selected samples that will differ across tests and across ethnic and racial groups on a variety of factors such as SES and education.

¹Also see figure A3 in the Appendix.

TABLE 1

Group Means (and Standardized Differences¹) on Tests by Ethnicity and Race

Group	SAT ² Verbal	SAT Math	ACT Composite ³	ACT English	ACT Mathematics	ACT Reading	ACT Science Reasoning	GRE ⁴ Verbal	GRE Quantitative	GRE Analytical	GMAT ⁵ Total	LSAT ⁶	MCAT ⁷ Verbal Reasoning	MCAT Physical Sciences	MCAT Biological Sciences
African American	434 (.83)	426 (.92)	17.1 (.98)	16.4 (.89)	16.9 (.88)	17.2 (.82)	17.3 (.98)	391 (.96)	416 (.98)	423 (1.11)	416 (1.03)	142.7 (1.14)	6.0 (.96)	6.1 (.96)	6.1 (1.08)
Asian American	498 (.25)	526 (.02)	21.8 (-.02)	20.5 (.13)	23.4 (-.39)	21.3 (-.13)	21.6 (.04)	487 (.07)	598 (-.46)	557 (.06)	533 (-.02)	152.7 (.08)	7.6 (.29)	8.9 (-.21)	8.8 (-.04)
Hispanic ⁸	456 (.63)	460 (-.61)	18.9 (.60)	17.9 (.61)	19.0 (-.47)	19.1 (-.5)	19.1 (.59)	438 (.53)	482 (-.46)	485 (-.62)	492 (-.35)	145.2 (.88)	5.9 (1.00)	6.3 (.88)	6.4 (.96)
White	526	528	21.7	21.2	21.4	22.1	21.8	495	540	564	531	153.5	8.3	8.4	8.7

¹Standardized Differences are computed between whites and each additional subgroup. The focal group mean (each subgroup) is subtracted from the reference group mean (whites) and divided by the standard deviation of the population. Standardized differences between subgroups are reported as a ratio of the test's overall standard deviation. The most recent published data on subgroup performance was used to construct the table.

²College Board (1998) SAT I verbal and SAT I math range from 200 to 800 with a standard deviation of 111 to 112.

³ACT (1998) Composite includes reading, math, science, and English tests, and ranges from 1 to 36 with a standard deviation of 4.7 in 1997-98. Each of the four subscales also ranges from 1 to 36 with the following standard deviations in 1997-98: English (5.4), Math (5.1), Reading (6), and Science (4.6).

⁴Graduate Record Examinations (GRE) (1998) Verbal, Quantitative, and Analytical tests range from 200 to 800 with standard deviations of 108 (Verbal) and 127 (Quantitative and Analytical) for 1997-98. Educational Testing Service (1998).

⁵Graduate Management Admission Test (GMAT) (1998) Total score mean is comprised of verbal and quantitative tests and ranges from 200 to 800 with a standard deviation of 112 for 1996-97. Educational Testing Service (1998).

⁶Law School Admission Test[®] (LSAT) scores range from 120 to 160, and the standard deviation is not available for this group. LSAT scores reported are for all students applying to law school in 1997-98. The standard deviation across all LSAT tests administered in 1998 was 9.44.

⁷Medical College Admission Test (MCAT) Verbal Reasoning, Physical Sciences, and Biological Sciences scales range from 1 to 15 with a standard deviation of 2.4 in 1998.

⁸For the SAT I, GRE, and GMAT, Hispanic is a weighted average of mean scores for three separate categories of groups: Mexican American/Chicano, Puerto Rican, and Other Hispanic or Latin American. For ACT it is a weighted average of Mexican American/Latino and Cuban/Puerto Rican/Other Hispanic. For LSAT it is a weighted average of Mexican American/Chicano, Hispanic, and Puerto Rican. For MCAT it is a weighted average of Mexican American/Chicano, Puerto Rican – Mainland, and Puerto Rican – Commonwealth.

National Assessments

Results on other standardized tests exhibit similar differences among ethnic and racial groups. Reading and math assessments administered to a representative sample of twelfth-grade students as part of the National Educational Longitudinal Survey (NELS, 1988)² illustrate similar disparities among ethnic and racial groups, as well as among groups with different socioeconomic status. The content of these assessments was determined by committees of teachers and researchers, and aligned with the school curriculum (Braun, 1998). Three levels of proficiency were defined in reading (with Level 1 indicating the lowest level of achievement and 3 the highest level of achievement), and five levels of proficiency were established in math. The performance of each ethnic and racial group improves with increasing SES status, but substantial differences also exist among ethnic and racial groups at each socioeconomic level. Table 2 illustrates the percent of each group at the highest levels for NELS: 88.

The National Assessment of Educational Progress (NAEP), also sponsored by the U.S. Department of Education, is an assessment of a nationally representative sample of students in grades 4, 8, and 12 in a variety of content areas. Results from the 1998 NAEP reading test illustrate that African-American and Hispanic students are less likely than white and Asian-American twelfth-graders to score at the “Proficient” or

TABLE 2

Mean and Percentage of Students at Highest Proficiency Levels in NELS: 88 Reading and Math Twelfth-Grade Assessments by Ethnicity/Race and SES

<i>Subgroup</i>	<i>Mean Reading Score</i>	<i>Percent at Level 3–Reading</i>	<i>Mean Math Score</i>	<i>Percent at Level 4 and 5 – Math</i>	<i>Percent at Level 5 – Math</i>
African American Low SES	17.9	5	29.8	6	0
African American Middle SES	20.8	10	34.1	14	0
African American High SES	23.6	20	40.9	32	2
Hispanic Low SES	20.6	10	33.7	12	0
Hispanic Middle SES	22.0	14	37.2	21	1
Hispanic High SES	23.5	22	43.5	41	5
White Low SES	21.2	11	35.2	17	1
White Middle SES	24.4	22	41.2	33	3
White High SES	27.5	37	47.2	55	9

²NELS: 88 is the most recent longitudinal study sponsored by the U.S. Department of Education. Probability sampling was used to select 25,000 eighth-graders representative of the national cohort in 1988. Data have been collected every two years, and assessment completed in 1992.

³Proficient level indicates that students have demonstrated competency over challenging subject matter, while the Advanced level indicates that students have demonstrated superior performances (Donahue, P.L., 1999).

TABLE 3

Percentage of Twelfth-Grade Students at the Proficient or Advanced Levels on NAEP 1998 Reading, 1996 Math, and 1996 Science Tests by Ethnicity and Race

<i>Group</i>	<i>Proficient</i>			<i>Advanced</i>		
	<i>Reading</i>	<i>Math</i>	<i>Science</i>	<i>Reading</i>	<i>Math</i>	<i>Science</i>
African American	17	4	4	1	0	0
Asian American	33	26	19	6	7	3
Hispanic	24	6	6	2	0	1
White	40	18	24	7	2	3

“Advanced” levels.³ Table 3 illustrates that approximately 7 percent of whites and Asian Americans reached the Advanced level compared to 1 percent of African Americans and 2 percent of Hispanics. Nearly 50 percent of white students and 40 percent of Asian-American students reached or exceeded the Proficient level, while 21 percent and 30 percent of African-American and Hispanic students, respectively, reached or exceeded this level. Even wider disparities are found on the 1996 twelfth-grade NAEP math and science tests (Bourque, M.L., et al., 1997; Reece, Miller, Mazzeo, and Dossey, 1997).

The math assessment administered in 1996 includes a variety of question formats, favoring constructed-response and performance-assessment questions over multiple-choice questions (Braun, 1998). Results from the NAEP mathematics assessment are presented in Table 4 and illustrate that two or three times as many white and Asian-American students are at Advanced and Proficient levels than Hispanic or African-American students. These results occur on the fourth-grade assessment where 28 percent of white and 26 percent of Asian-American students are at or above proficiency in math, compared to only 8 and 5 percent of Hispanic and African-American students, respectively. NAEP results for twelfth-graders are similar to scoring patterns for students in grades four and eight, indicating that very large gaps in achievement are present during the first few years of schooling.

A third assessment sponsored by the federal government is the National Adult Literacy Survey (U.S. Department of Education, 1992). The 1992 assessments of prose, document, and quantitative literacy were entirely open-ended and administered to a nationally representative sample of adults 16 years of age and older. Again, these data illustrate substantial differences in average proficiency among groups, with African-

TABLE 4

Percentage of Students at Each Proficiency Level on NAEP 1996 Math Assessment by Ethnicity and Race (Reese, Miller, Mazzeo, and Dossey, 1997)

<i>Subgroup</i>	<i>Advanced</i>	<i>At or Above Proficient</i>	<i>At or Above Basic</i>
GRADE 4			
African American	0	5	32
Asian American	5	26	73
Hispanic	1	8	41
White	3	28	76
GRADE 8			
African American	1	4	28
Asian American	*	*	*
Hispanic	1	9	39
White	5	31	74
GRADE 12			
African American	0	4	38
Asian American	7	33	81
Hispanic	1	6	50
White	2	20	79

* Sample size insufficient to permit a reliable estimate.

American and Hispanic participants falling disproportionately at lower proficiency levels (Kirsch, Jungeblut, Jenkins, and Kolstad, 1993). It is important to note that these national testing programs do not rely on self-selected samples as admission tests do, but rather use stratified representative samples.

Performance Assessments

It has been suggested that performance assessments, popularized as an important component in educational reform movements, will reduce differences among groups because they provide students with hands-on opportunities to demonstrate their knowledge and understanding of how to solve problems rather than requiring students to simply recall facts (Shavelson, 1997). Proponents of these assessments reason that such assessments should narrow gaps among groups because they are designed to allow for varying styles, with less emphasis on guessing and test-wiseness strategies that would penalize minority groups (Jenkins and MacDonald, 1989; Neil and Medina, 1989).

Unfortunately, few large-scale studies have examined differences among ethnic and racial groups on performance assessments, and even fewer studies have considered the impact of SES factors. Studies on performance assessments published at the beginning of the current educational reform movement mostly indicated that subgroup gaps on traditional tests remain for these assessments (Dunbar, Koretz, and Hoover, 1991; Linn,

Baker, and Dunbar, 1991). As noted above, the results from NAEP math and science tests that place substantial emphasis on performance tasks support this contention. Few additional studies have added new information to this discussion. Klein, Josavnoic, Stecher, McCaffrey, Shavelson, Haertel, Solano-Flores, and Comfort (1997) discuss several studies that used the NAEP fourth- and eighth-grade assessments. They also reported gaps between racial and ethnic groups on extended-response tasks in mathematics and in oral reading that were comparable to, or exceeded the gaps found on, multiple-choice NAEP items. These authors then examined differences among groups on hands-on performance assessments and a traditional standardized test (the Iowa Test of Basic Skills, or ITBS) administered to students in grades five, six, and nine in conjunction with a field test of the California Learning Assessment System (CLAS). Klein et al. (1997) found differences on the ITBS science subtest were almost identical to differences on the performance assessments, concluding “differences in mean scores among racial/ethnic groups were not related to test or question type. No matter which type was used, whites had much higher means than blacks and Hispanics” (p. 95). Similar results have been found on performance assessments in mathematics by Baxter, Shavelson, Herman, Brown, and Valdez (1993).

Advanced Placement Examinations

The College Board’s Advanced Placement Examinations are of relevance since all examinations include constructed-response tasks that constitute a substantial portion of a student’s total grade. Ethnic and racial group differences on four of the largest volume AP Examinations given in May 1996 are displayed in Table A1 of the Appendix. Mean differences on these four examinations are quite pronounced for African-American and Hispanic students, as are the percentages of students with grades of 3 or higher (typically used by most colleges in awarding college credit). Hispanic students fare significantly better when viewing mean performance across all examinations because Spanish Language comprises nearly 30 percent of all examinations for this group, and they achieve an average grade of over 4.35 on this examination. African-American and Hispanic AP students comprised 3 percent and 5 percent, respectively, of all students with grades of 3 or higher across all AP examinations, compared to Asian-American and white AP students who accounted for 13 percent and 72 percent of students with grades of 3 or higher.

Whites outperformed African-American and Hispanic students on multiple-choice and free-response

TABLE 5

Percentage of Students by Mean High School Grades and Rank for Ethnic and Racial Groups

<i>Subgroup</i>	<i>Mean High School Grades</i>				<i>Mean High School Rank</i>			
	<i>A</i>	<i>B</i>	<i>C</i>	<i>Below C</i>	<i>90th</i>	<i>80th</i>	<i>60th</i>	<i>Below 60th</i>
African American	18.9	53.2	26.8	1.1	11.9	18.8	28.7	40.6
Asian American	47.5	42.7	7.0	0.0	27.8	24.9	25.7	21.7
Hispanic	30.0	53.4	16.1	0.5	16.5	21.5	28.5	33.5
White	40.3	47.8	11.7	0.3	23.2	23.2	27.3	26.3

sections of nearly all AP Examinations, and Asian Americans generally had higher scores on both sections for most AP Examinations as well (Morgan and Maneckshana, 1996). Standardized differences were computed to express differences in mean scores in units of standard deviations and are a standardized measure of differences (Strumpf and Stanley, 1998). Standard differences between whites and African Americans, and whites and Hispanics are generally slightly larger on the multiple-choice sections of most AP Examinations than they are on the free-response sections, with notable exceptions for calculus, chemistry, and art history. For example, in 1992-95, standardized differences between African Americans and whites, for free-response sections, ranged between .63-.69 for AP English and between .58-.70 for AP Biology, as compared to differences of .78-.90 and .62-.82 on the multiple-choice sections on each of these respective examinations. For Hispanics, standardized differences on free-response sections ranged from .31-.39 and .30-.34 on AP English and AP U.S. History from 1992-95, compared to .51-.55 and .37-.41, respectively (Morgan and Maneckshana, 1996).

Group Differences in High School and College Grades and Academic Preparation

High School Rank and Course Grades

While there has been increasing focus placed on the ethnic and racial score gaps in tests over the past few years, there has been substantially less attention paid to performance on other educational measures. The question is: are ethnic and racial differences only found on test scores or do similar differences exist in other educational measures? Admission officers report that the greatest weight (i.e., 40 percent) is placed on high school grades for mak-

ing admission decisions, with less weight placed on admission test scores (Black, September 1998).

Traditional measures of academic achievement, such as grades and class rank, also show severe underrepresentation of African Americans and Hispanics among top students (National Task Force on Minority High Achievement, 1999). Table 5 illustrates these differences for the 1997 College-Bound Seniors who took the SAT I. Over 40 percent of white and Asian-American students reported having an A average in high school in 1997, compared to less than 20 percent of African-American and 30 percent of Hispanic students. The ethnic and racial group disparities persist when we examine mean high school grades and class rank. Again, according to their self-reported class rank, white and Asian-American students are twice as likely to be in the top 10 percent of their high school class as African Americans.

Mean ethnic and racial subgroup differences in freshman college course grades are even larger than differences in high school grades. Freshman grades are substantially lower than high school grades for each group, but differences are most notable among Hispanic and African-American students. Table 6 illustrates mean grades by subgroup for 46,379 students attending 55 colleges and universities (Ramist, Lewis, and McCamely-Jenkins, 1993). High school grades alone provide a deceptive picture of how well students are likely to perform in college. The disparity between high school and college grades is quite striking for all groups, ranging from .74 to 1.06, with the largest differences found for underrepresented minorities (African American, 1.04; Hispanic, 1.06), with somewhat smaller disparities for Asian-American (.78) and white test-takers (.74). That is, Hispanics and African Americans

TABLE 6

Mean High School and College GPA and Differences by Ethnicity and Race

<i>Subgroup</i>	<i>High School GPA</i>	<i>Freshman GPA</i>	<i>Difference</i>
African American	3.18	2.14	1.04
Asian American	3.58	2.80	.78
Hispanic	3.43	2.37	1.06
White	3.40	2.66	.74

are still likely to get lower average grades in high school and college than other groups of students; however, high school grades used alone will disproportionately over predict college performance for these groups relative to Asian-American and white students.

Academic Preparation

Student course-taking reflects both the breadth and depth of course offerings at a school and the opportunities or challenges taken by students. For example, a school's curriculum may contain mostly "basic" or "survey" courses, or it may contain a range of advanced or honors courses. Attending a school with an extensive list of courses may not be enough to assure equal access to such challenging courses. If advanced courses are not required, students may elect to take less challenging courses that require less work. Other schools may deny access to some groups of students, employing gatekeeper courses and student tracking (Finn, 1999). Research on academic preparation is unambiguous—academic achievement is directly related to challenging course work (Adelman, 1999). All groups of students benefit from taking more rigorous courses, even after controlling for differences in SES, aptitude, and/or prior achievement.

Using data from the NAEP High School Transcript Study, Finn (1999) reports that about one-third of high schools did not offer any advanced courses in science and another 28 percent offered advanced work only in one science subject (typically biology). Graduation requirements tend to include far fewer advanced and core academic courses than most colleges and universities hold as a minimum for admission. Less than half of U.S. high schools required three years of math, and just over one-quarter of high schools required three years of science. Students in private schools generally take more

courses in core academic areas than students in public schools. "Both the breadth and depth of course offerings were consistently lacking in schools located in small and rural communities [and]...students in high-SES schools took more courses, and more advanced courses than students attending schools in other SES categories" (Finn, 1999, pp. 5–7).

Differences continue to exist in terms of advanced courses completed and the number of courses taken in core academic disciplines. Participation in college-level courses such as those offered by AP programs is another indicator of the academic intensity of high school curriculum. Table 7 illustrates the number and percent of students, by ethnicity and race, completing AP Examinations in core academic areas (English, math, history, or science) in 1997 by highest parental education. Among students completing one or more AP Examinations in 1997, 71 percent of the students were white and 12 percent were Asian American, compared to Hispanic and African-American students who comprised 8 percent and 5 percent of the cohort, respectively. In California, Hispanics are considerably less likely to complete AP courses than other ethnic groups and less than 25 percent of Hispanics completing AP courses reported family incomes of \$70,000 or more (compared to over 40 percent of whites and 33 percent of Asian Americans) (Camara, 1998). In addition, only 35 percent of Hispanic high school seniors in California report that they were enrolled in college preparatory programs in 1997, compared to over 50 percent of white students, and of all the racial and ethnic groups, Hispanic students earn the fewest number of credits in science and math courses while in high school. The good news, however, is that the largest proportional growth in AP for California occurred for African-American (66 percent increase) and Hispanic (88 percent increase) groups since 1990 (Camara, 1998).

TABLE 7

Participation in AP/Honors Courses for Ethnic and Racial Groups by Parental Education¹

Highest Parental Education	AFRICAN AMERICAN				ASIAN AMERICAN				HISPANIC				WHITE			
	Number	% of total	Mean SAT-V	Mean SAT-M	Number	% of total	Mean SAT-V	Mean SAT-M	Number	% of total	Mean SAT-V	Mean SAT-M	Number	% of total	Mean SAT-V	Mean SAT-M
Some High School	1,083	24	434	435	3,817	42	465	555	5,507	35	451	463	2,300	30	512	516
High School Graduate	4,985	26	452	466	4,110	46	498	571	5,345	38	482	484	29,383	35	531	532
Some College	12,136	33	479	463	8,369	50	518	573	10,104	44	507	506	78,208	42	548	548
College Graduate	6,621	38	505	489	11,620	55	545	604	5,469	49	536	533	83,873	52	573	576
Some Grad. School/ Graduate Degree	8,303	44	529	511	18,215	64	591	639	8,050	50	552	552	137,063	59	597	598
TOTAL ²	33,128	7.5			46,131	10.4			34,475	7.7			330,827	74.4		

¹In 1997, 491,297 college-bound seniors reported taking or planned to take at least one AP/honors course in either English, math, history, or science. Of these, 462,118 (94 percent) provided information regarding parental education and race/ethnicity.

²The percentage of each minority group in the total sample.

Sizable differences are found between ethnic and racial subgroups of college-bound students in total years of math and science completed (see Tables A2 and A3 in the Appendix). Students from families with higher levels of education are more likely to complete more years of science and math across all ethnic and racial groups. However, differences in years of science and math courses completed exist across ethnic and racial groups even when parental education and income are held constant. For example, about one-third of African-American and Hispanic students from families where one parent has a high school degree or less are likely to complete four years of science in high school, compared to approximately 50 percent of Asian-American students and 44 percent of white students with similarly educated parents. Similar trends are found in comparisons of years of math completed, although the magnitude of group differences is smaller. These trends also remain when family income is substituted for parental education. Finn (1999) reports that underrepresented minorities tend to have less access to advanced courses at the same school than other groups and that tracking has a strong and consistent impact on the rigor and intensity of courses completed in high school.

Adelman (1999) has recently found that the intensity and quality of secondary school curriculum have the greatest impact on completion of a bachelor's degree for students in the High School and Beyond/Sophomore cohort that graduated high school in 1988 and earned a degree by 1993—far greater impact than SES, ethnicity and race, and even test scores and high school class rank. The impact of curriculum intensity and quality is more pronounced for African-American and Hispanic students than any other precollegiate indicator of academic resources. Table A-4 is reprinted from Adelman (1999) and demonstrates that bachelor's degree completion rates increase most substantially for African-American and Hispanic students in the highest 40 percent of curriculum intensity who completed trigonometry or a higher level math course. He also notes that curriculum intensity and quality correlated more strongly with entering college and completing a bachelor's degree, .41 and .54, respectively, than other measures of academic resources (twelfth-grade test, class rank, curriculum intensity alone, and highest math course).

Some research has attempted to account for differences in school quality in examining subgroup score differences. Klein et al. (1997) found that rough adjustments for school quality reduced the gap on the ITBS and performance assessments between white and African-American students by about .25 of a standard deviation. They note that differences in school quality and opportunities may account for much of the difference found among groups.

In a similar study, Schmidt (1999) found that, when controlling for parental education, family income, and course-taking patterns, the white and Hispanic SAT I mean score gap was reduced from approximately 55 points on math and 59 points on verbal to 28 points on math and 33 points on verbal. In contrast, the same analysis reduced the white and African-American SAT I mean score gap from 93 points on math and 84 points on verbal to 65 points on math and 56 points on verbal. In other words, when minority students are compared to majority students who are most like them in terms of parental education, family income, and course-taking patterns, the gap in SAT I scores is substantially reduced. Of course, these groups may still differ in various ways that are not readily detected by using these three above variables to control for differences. Access to quality instruction, the breadth and depth of instruction, opportunity to learn, and level of educational support available in the school, home, and family may still differ among groups in ways that are largely undetected when using simply contrasts and descriptive comparisons of groups.

College Access and Graduation

Alternative criteria such as persistence in college and graduation also illustrate similar gaps. For example, the National Center for Educational Statistics (1996, p. 318) reported that 56.4 percent of white students seeking a bachelor's degree in 1989-90 received a degree or certificate within four years, while the figures for African-American and Hispanic students were 45.2 percent and 41.3 percent, respectively. The National Collegiate Athletic Association (NCAA) also tracks six-year graduation rates among full-time degree-seeking students for its 306 Division 1 schools. NCAA graduation rates by ethnic and racial groups are illustrated in Table 8. The NCAA graduation rates are lower among males than females for every ethnic and racial group.

TABLE 8

NCAA Division I Six-Year Graduation Rates by Ethnicity and Race: 1991 to 1996

<i>Ethnic and Racial Group</i>	<i>1991 Graduation Rate (%)</i>	<i>1996 Graduation Rate (%)</i>	<i>Percent Change 1991-96</i>
African American	33	38	5
Asian American	61	63	2
Hispanic	41	45	4
White	54	56	2
Total	54	56	2

Using the College and Beyond database of 28 selective universities, Bowen and Bok (1998) reported the following six-year graduation rates for 1989 matriculating freshmen: African American, 75 percent; Hispanic, 81 percent; Asian American, 88 percent; and white, 86 percent. Among persons 25 to 29 years of age, whites were twice as likely to have completed four or more years of college (28.1 percent) in 1996 than African Americans (14.6 percent) or Hispanics (10.0 percent) (U.S. Department of Commerce, 1997). Somewhat smaller differences exist in college enrollment figures. Census data report that 67.4 percent of whites between the ages of 16 and 24 enrolled in college immediately after completing high school compared to 56 percent and 51 percent of African-American and Hispanic high school graduates,⁴ respectively.

In addition, several studies have demonstrated that SAT I scores and high school grades have a strong and practical impact on predicted graduation rates (Adelman, 1999; ETS, June 2, 1998; Manski and Wise, 1983; Widaman, February 5, 1998). Widaman (1998) explains that SAT I scores have only slightly less weight in predicting graduation than high school grades. The actual effect of high school grades and admission tests in predicting attrition and graduation is underestimated in most such studies because a substantial proportion of students included as college dropouts or “attrites” are in good academic standing and either transfer to other colleges or leave for personal or financial reasons (Adelman, 1999).

Family Income, Wealth, Education, and Circumstances

Many skeptics of standardized testing see the relationship between increased SES and higher test scores as proof that tests primarily measure family status and wealth. Certainly, increased family income and parental education are associated with higher scores on tests such as the SAT I. This pattern is found for all ethnic and racial groups. However, SES is also related to most other predictors and outcomes of academic performance (see Figures 1 and 2). Mean differences between groups on the SAT I by parental education are illustrat-

ed in Figures 3 and 4. Similar patterns in Figures A1 and A2 (in the Appendix) illustrate the same trend for family income. Table 9 reports mean SAT I scores and standardized differences in 1997 by parental income and education.

These figures illustrate that parental education and family income are related to performance on tests such as the SAT I. They also illustrate that African-American and Hispanic students from comparable SES scored lower on the SAT I than Asian-American and white college-bound students in 1997. This finding is not unique to the SAT I or even admission tests in general. Table 2 illustrates those same trends between SES and NELS. Middle SES white children are more likely to be at the highest proficiency levels of NELS than upper-SES Hispanic and African-American students. Such patterns are also found on nontest measures such as grades and class rank. Tables 10 and 11 illustrate that mean high school GPA and rank are related to parental education and family income. Figures 5 and 6 illustrate that as with tests, substantial differences exist among ethnic and racial groups having similar levels of parental education. Again, the same trends can be found if family income is used in place of parental education. That is, differences among groups with similar levels of socioeconomic background are found in a number of educational measures, not just test scores. Adelman (1999) found a modestly strong correlation of .37 between SES and a composite measure of academic resources (comprised of a mini SAT I, high school class rank or GPA, and the quality and intensity of high school curriculum).

Hispanic and African-American college-bound students from families at the highest levels of income (greater than \$100,000) are about as likely (or in some

TABLE 9

Mean SAT I Scores (and Standardized Differences)¹ by Parental Education and Family Income for College-Bound Seniors, 1997

Highest Parental Education					
	Some HS	HS Graduate	Some College	College Graduate	Some Grad./Degree
SAT I-V	413 (-.83)	461 (-.40)	488 (-.15)	522 (.15)	552 (.47)
SAT I-M	445 (-.59)	467 (-.39)	489 (-.20)	529 (.16)	556 (.40)
Combined Parental Income					
	< \$20,000	\$20-35,000	\$35-60,000	\$60-100,000	>\$100,000
SAT I-V	447 (-.52)	487 (-.16)	509 (.04)	531 (.23)	560 (.50)
SAT I-M	461 (-.45)	490 (-.19)	511 (0)	536 (.22)	572 (.55)

¹Standardized differences are computed between total group and each subgroup. The total mean (505 verbal and 511 math) is subtracted from the subgroup mean and divided by the population standard deviation (111 verbal and 112 math). Positive values indicate a higher score for the subgroup.

⁴Because of small sample sizes three-year averages were used to calculate African-American and Hispanic enrollments (U.S. Department of Education [1998], *The Condition of Education 1998*. Washington, DC: Author).

TABLE 10

High School GPA and Rank by Parental Education¹

GPA	Some High School		High School Graduate		Some College		College Graduate		Some Graduate/Degree	
	Number	%	Number	%	Number	%	Number	%	Number	%
A average	9,711	27.48	33,008	28.07	78,440	31.83	79,521	40.79	128,883	46.98
B average	18,716	52.96	62,824	53.43	127,266	51.65	91,906	47.14	118,896	43.34
C average	6,612	18.71	21,113	17.96	39,549	16.05	22,925	11.76	25,832	9.42
Below C average	302	0.85	634	0.54	1,167	0.47	614	0.31	745	0.27
Total	35,341		117,579		246,422		194,966		274,356	
SAT I-V Mean	413		461		488		522		552	
SAT I-M Mean	445		467		489		529		556	
HS Rank	Some High School		High School Graduate		Some College		College Graduate		Some Graduate/Degree	
	Number	%	Number	%	Number	%	Number	%	Number	%
90th	4,798	15.57	15,580	14.86	37,252	16.85	40,705	22.99	71,899	29.02
80th	6,704	21.76	21,048	20.08	47,398	21.44	41,699	23.55	61,527	24.83
60th	8,521	27.65	29,971	28.59	64,232	29.06	48,950	27.64	62,957	25.41
Below 60th	10,790	35.02	38,246	36.48	72,179	32.65	45,718	25.82	51,373	20.74
Total	30,813		104,845		221,061		177,072		247,756	
SAT I-V Mean	416		463		489		523		554	
SAT I-M Mean	450		470		492		532		559	

¹1997 College-Bound Seniors.

TABLE 11

High School GPA and Rank by Parental Income¹

GPA	Combined Parental Income									
	Less than \$20,000		\$20-\$35,000		\$35-\$60,000		\$60-\$100,000		More than \$100,000	
	Number	%	Number	%	Number	%	Number	%	Number	%
A average	34,370	30.02	51,424	33.74	102,387	37.75	92,332	41.43	49,050	45.55
B average	58,788	51.35	76,796	50.38	132,226	48.75	103,733	46.54	48,065	44.63
C average	20,479	17.89	23,449	15.38	35,630	13.14	26,169	11.74	10,304	9.57
Below C average	838	0.73	756	0.5	966	0.36	636	0.29	266	0.25
Total	114,475		152,425		271,209		222,870		107,685	
SAT I-V Mean	447		487		509		531		560	
SAT I-M Mean	461		490		511		536		572	
Rank	Combined Parental Income									
	Less than \$20,000		\$20-\$35,000		\$35-\$60,000		\$60-\$100,000		More than \$100,000	
	Number	%	Number	%	Number	%	Number	%	Number	%
90th	17,787	17.60	25,686	18.73	52,686	21.45	48,399	23.96	25,676	26.81
80th	22,203	21.97	30,112	21.96	55,285	22.51	47,235	23.39	23,541	24.59
60th	27,446	27.16	38,460	28.05	68,381	27.84	54,973	27.22	25,371	26.50
Below 60th	33,626	33.27	42,869	31.26	69,266	28.20	51,380	25.44	21,165	22.10
Total	101,062		137,127		245,618		201,987		95,753	
SAT I-V Mean	450		489		511		533		561	
SAT I-M Mean	465		493		514		539		574	

¹1997 College-Bound Seniors.

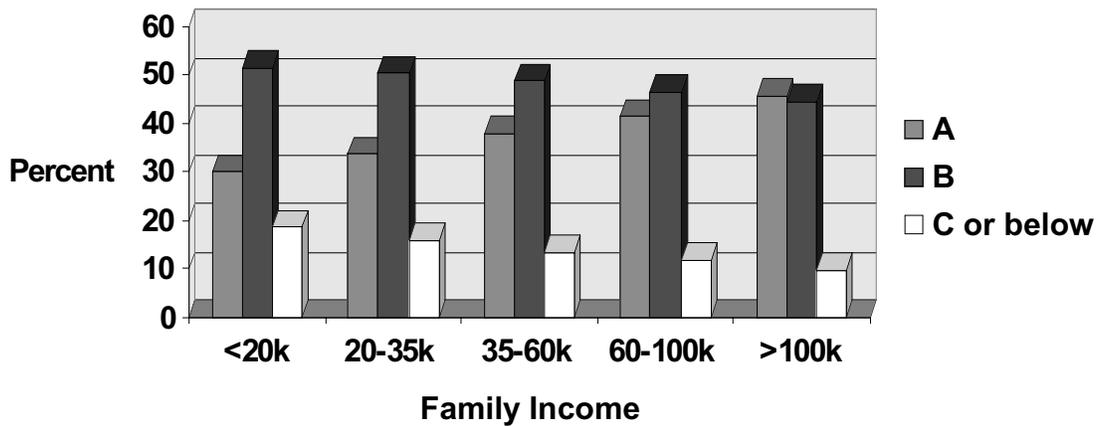


Figure 1. Income by high school grade-point average. Self-reported family income by high school average grades, 1997 College-Bound Seniors.

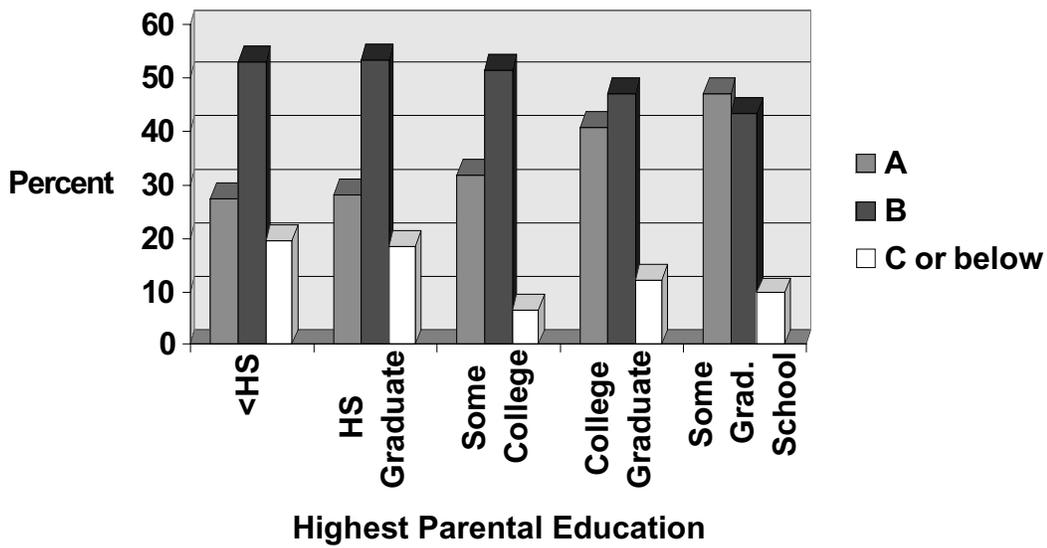


Figure 2. Parental education by high school grade-point average. Self-reported highest level of parental education by high school average grades, 1997 College-Bound Seniors.

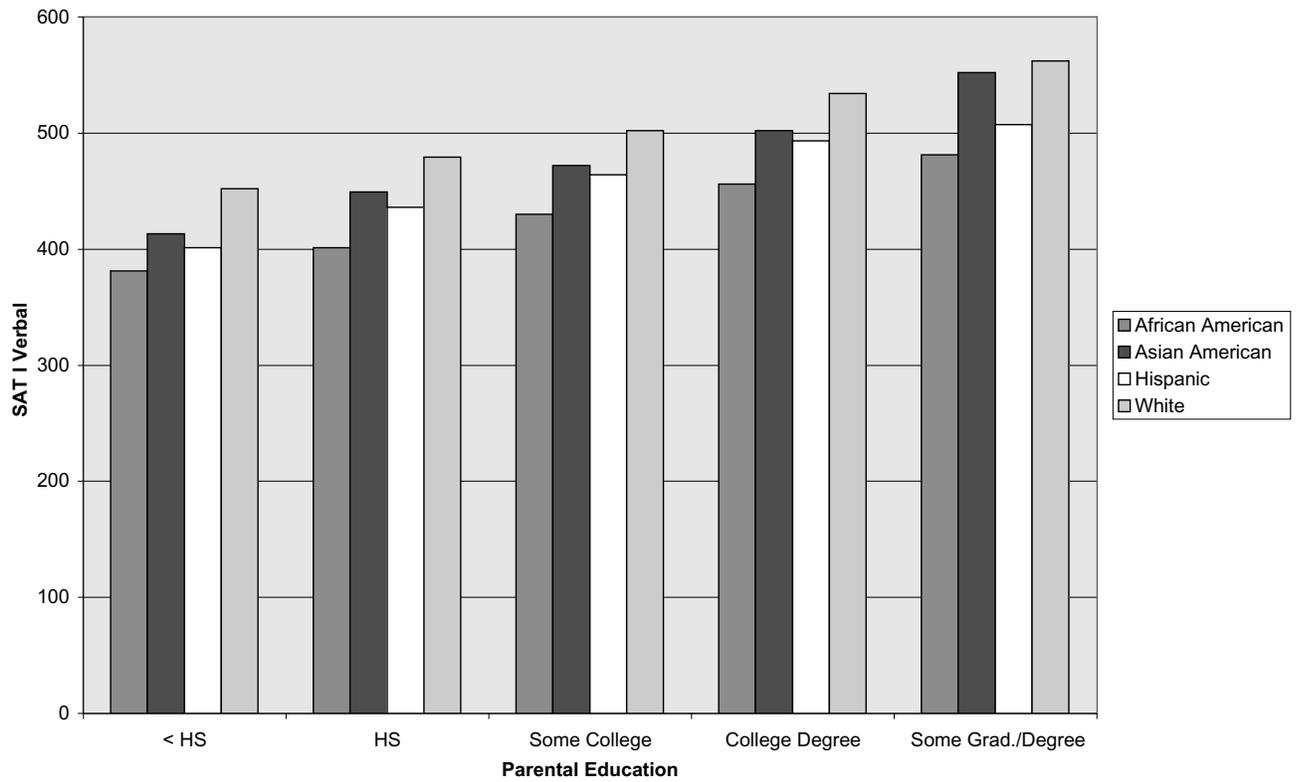


Figure 3. Mean SAT I verbal score for ethnic and racial groups by parental education.

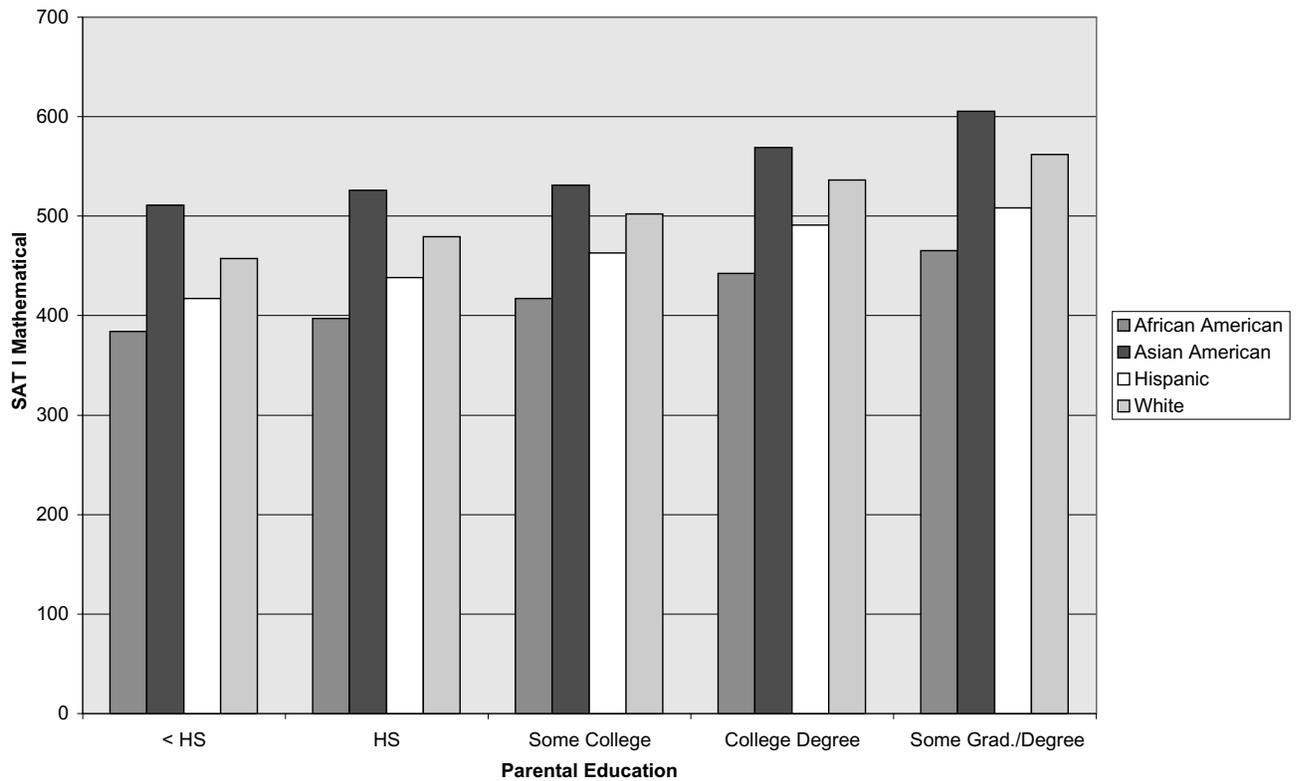


Figure 4. Mean SAT I math score for ethnic and racial groups by parental education.

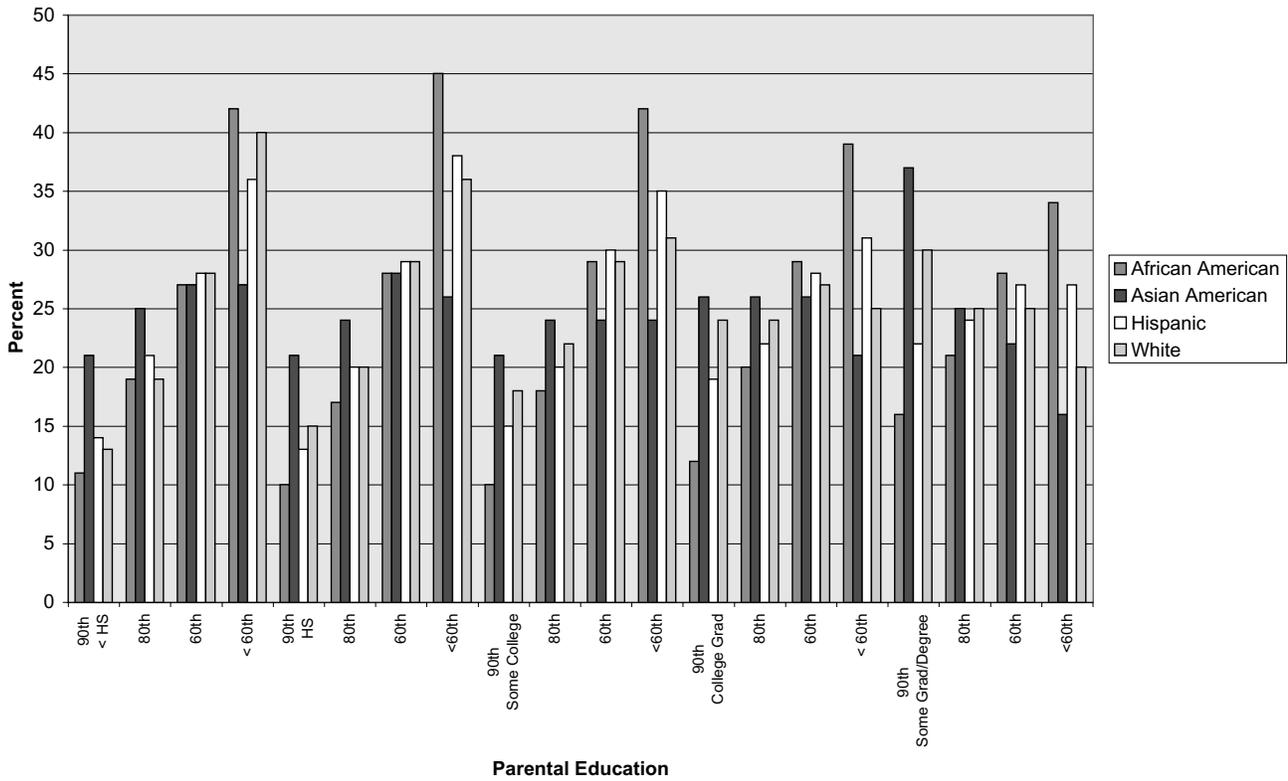


Figure 5. High school rank for ethnic and racial groups by parental education.

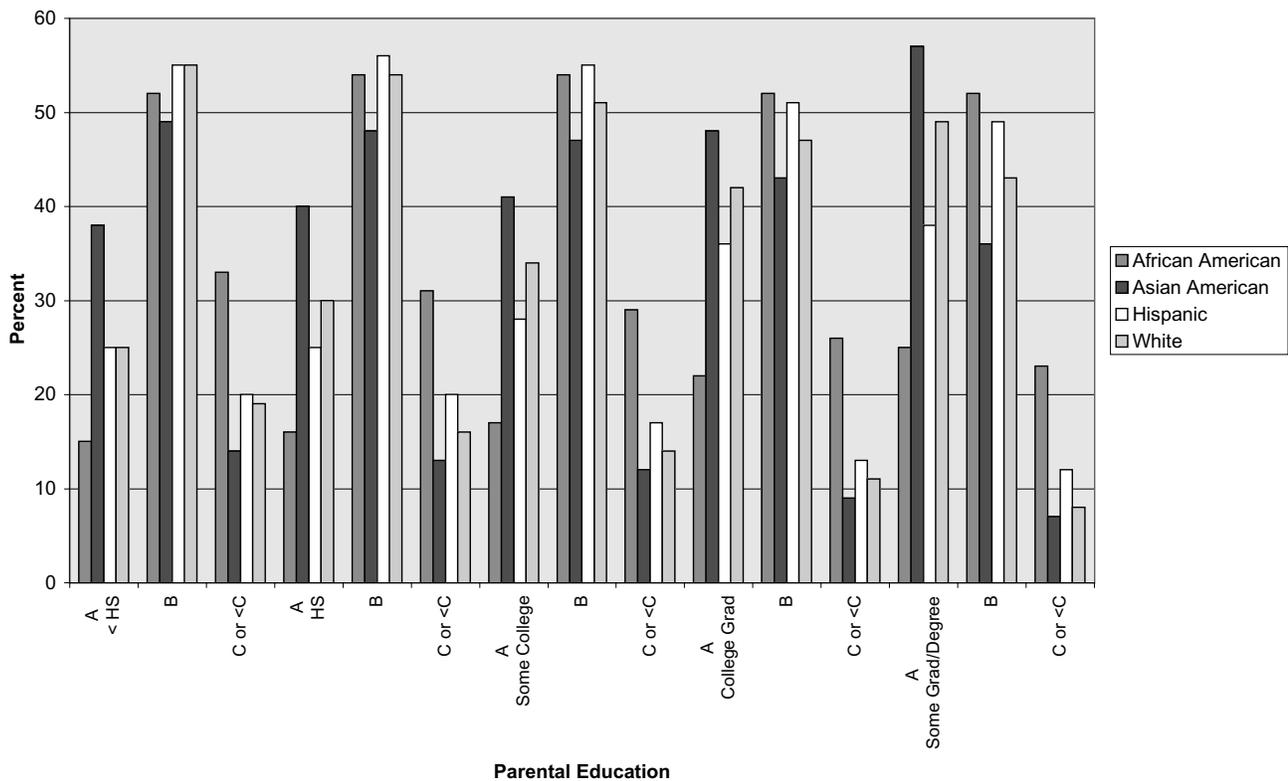


Figure 6. Mean high school grades for ethnic and racial groups by parental education.

cases, less likely) to have an A average in high school, or be in the top 10 percent of class rank, than Asian-American and white students from families at the lowest income level (less than \$20,000). The same findings apply to parental education. African-American and Hispanic students are more likely to come from families with lower parental education and less income. In addition, on average, underrepresented minorities coming from families with the highest levels of income and parental education still often lag substantially behind white and Asian-American students from families with less income and education in terms of test scores, grades, and class rank. At every educational or income level, Hispanics and African Americans are less likely to excel in high school grades and class rank than other students. Furthermore, only 28 percent of African-American students from families with income above \$100,000 reported having an A average in high school, compared to 42 percent and 35 percent of Asian-American and white students, respectively, having family incomes below \$20,000.

SES is also related to attending college. Seventy-eight percent of students between the ages of 16 and 24 from families with high income enrolled in college immediately upon completion of high school, compared to 63 percent and 49 percent of students from middle- and low-income families, respectively (U.S. Department of Commerce, 1997). Increased family income is also related to greater expectations of attending a four-year college, completing an admission test and applying to a four-year college, and acceptance at a four-year college (U.S. Department of Education, 1994).

The influence of SES is also found on statewide performance-based assessments and at earlier grades. Results on new English and language arts performance assessments in New York State were far stronger in middle-class and affluent suburban communities than in urban and rural areas with high poverty levels (Hendrie, June 2, 1999).

Bowen and Bok (1998) have discussed some of the limitations in existing measures of SES, noting that “college grades may well be less affected by family income and parental education per se than they are by the number of books in the home, opportunities to travel, better secondary schooling, the nature of the conversation around the dinner table, and more generally, parental involvement in their children’s education” (p. 80). Results using parental education and family income may fail to capture even larger gaps between ethnic and racial groups in SES because they do not account for large gaps in accumulated wealth, and especially financial assets, that persist after controlling for education and income (Oliver and Shapiro, 1995).

The College Board formed the National Task Force on Minority High Achievement in 1997 to examine why academic achievement of underrepresented minorities lags behind that of white and Asian-American students at essentially all socioeconomic levels. The Task Force Report notes that students from low-income homes, or who have parents with little formal education, are much more likely to be low achievers than students from upper-income families or who have parents with college degrees. “This pattern, coupled with the very high percentages of African-American, Latino, and Native-American children living in poverty, has understandably led many educators and policymakers to give priority to school reform, early childhood education and other strategies intended to improve educational outcomes for disadvantaged minority youngsters” (National Task Force on Minority High Achievement, 1999, p. 13).

Existing measures of SES may be too gross and not sensitive enough to detect actual differences that may affect academic achievement. Accumulated wealth, including a family’s savings, home equity, retirement, and stocks, may be fairer and more sensitive measures of financial resources than annual income. Research has found that white families often have three or four times more financial resources or accumulated wealth than minority families at the same income level. Similarly, some researchers speculate that minority children may be more likely than whites to overstate or misconstrue their parents’ educational history and annual income on self-reported measures (Belluck, July 4, 1999).

Conclusion

The stark differences across assessments and other measures collectively illustrate the inequities minorities have suffered through inadequate academic preparation, poverty, and discrimination; years of tracking into dead-end educational programs; lack of advanced and rigorous courses in inner-city schools, or lack of access to such programs when available; threadbare facilities and overcrowding; teachers in critical need of professional development; less family support and experience in higher education; and low expectations (Stewart, June 22, 1999). There have been encouraging signs—the SAT score gap has declined somewhat for most minorities in the past 20 years, and minorities now represent a record 33 percent of college-bound students, up from 22 percent in 1987. The work of Adelman (1999) and Schmidt (1999) suggests that when minority students are given opportunities to take more rigorous courses, the test score gaps not only diminish, but more

important, the outcomes, such as graduation rates, significantly increase. There is increased evidence that well-designed and well-implemented elementary school reform programs can help disadvantaged minority students attain high levels of achievement. However, as Jencks and Phillips (1998) point out, much more research is needed to identify the causes of the differences that persist across test scores, grades, and educational outcomes so that real change can occur. These and other findings have led the National Task Force on Minority High Achievement (1999) to recommend action in three areas: (1) expand efforts to increase the number of high-achieving underrepresented minority students in college, (2) build a sustaining minority high-achievement dimension in school reform initiatives, and (3) expand the use of supplementary educational strategies as a means of supporting high academic performance among more minority students.

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Appendix

TABLE A1

Mean Grade and Percentage of Examinations Graded 3 or Higher on Selected and Total AP Examinations¹ in 1996 by Ethnicity and Race

<i>Exam Subgroup</i>	<i>U.S. History</i>		<i>Biology</i>		<i>English Literature</i>		<i>Calculus AB</i>		<i>ALL Exams</i>	
	<i>Mean</i>	<i>% 3 +</i>	<i>Mean</i>	<i>% 3 +</i>	<i>Mean</i>	<i>% 3 +</i>	<i>Mean</i>	<i>% 3 +</i>	<i>Mean</i>	<i>% 3 +</i>
African American	2.19	31.5	2.19	35.2	2.21	33.5	1.96	31.8	2.20	35.1
Asian American	3.00	59.6	3.30	69.7	3.03	67.0	3.00	64.0	3.08	65.8
Hispanic	2.34	37.1	2.50	44.6	2.55	47.5	2.37	43.8	3.06	61.0
White	3.00	64.3	3.09	64.5	3.05	70.0	2.91	63.1	3.00	64.3

¹AP Examinations are graded on a 1 to 5 scale. All data are based on total examinations, not individual students.

TABLE A2

1997 Percentage of College-Bound Senior Years of Science by Ethnicity and Race and Highest Parental Education¹

	<i>African American</i>		<i>Asian American</i>		<i>Hispanic</i>		<i>White</i>	
	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>
Some High School	25	33	20	46	30	27	19	40
High School Grad.	19	34	15	51	22	35	15	45
Some College	19	37	16	59	20	39	15	47
College Graduate	15	43	13	58	15	47	10	52
Some Graduate School	13	48	9	66	13	52	9	57
Total N / % ²	15,418 (17%)	35,167 (39%)	2,345 (3%)	45,317 (57%)	15,154 (20%)	29,773 (40%)	75,332 (12%)	328,263 (51%)

¹1,127,021 of college-bound seniors completed the SAT I. Of these, 920,709 (82 percent) provided information on parental education, race or ethnicity, and years of science. The percentage of students completing three years of science courses can be approximated by subtracting those completing two years or less of science and four years or more of science from 100.

²Percent of total of all students within each ethnic and racial group completing that level of science coursework, across all levels of parental education.

TABLE A3

1997 Percentage of College-Bound Senior Years of Math by Ethnicity and Race and Highest Parental Education¹

	<i>African American</i>		<i>Asian American</i>		<i>Hispanic</i>		<i>White</i>	
	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>	<i>2 years or less</i>	<i>4 years or more</i>
Some High School	5	58	3	75	4	61	4	61
High School Grad.	4	60	3	76	4	62	4	64
Some College	4	61	3	62	3	64	3	66
College Graduate	3	64	3	79	3	70	2	71
Some Graduate School	3	69	2	82	2	72	2	74
Total N / % ²	3,511 (1%)	57,803 (63%)	2,139 (1%)	62,562 (78%)	2,656 (1%)	50,052 (65%)	18,526 (1%)	451,087 (70%)

¹1,127,021 college-bound seniors completed the SAT I. Of these, 930,462 (83 percent) provided information on parental education, race or ethnicity, and years of math. The percentage of students completing three years of math courses can be approximated by subtracting those completing two years or less of math and four years or more of math from 100.

²Percent of total of all students within each ethnic and racial group completing that level of math coursework, across all levels of parental education.

TABLE A4

Curriculum Rigor and Intensity, Test Scores, and High School Grade-Point Average or Rank by Ethnicity and Race, 1982–1993

	<i>African American</i>	<i>Asian American</i>	<i>Hispanic</i>	<i>White</i>	<i>Total</i>
Total	45.1% (3.14)	86.9% (2.79)	60.8% (7.27)	75.4% (1.16)	72.1% (1.07)
Curriculum: Highest 40% and math beyond Algebra 2.	72.6 (4.98)	89.0 (3.47)	79.3 (7.34)	85.7 (1.44)	84.8 (1.33)
Test Scores: Highest 40%	67.1 (3.66)	94.7 (1.90)	66.6 (8.38)	80.5 (1.17)	79.9 (1.09)
Class Rank/GPA: Highest 40% of Combined Variable	58.8 (4.56)	84.9 (2.95)	57.0 (7.44)	78.9 (1.26)	77.1 (1.19)

Notes: (1) Universe for “total” consists of all on-time high school graduates who entered four-year colleges directly from high school, and whose college transcript files are not incomplete (Weighted N=859 K); the universe for the three component groups adds high school records with positive values for all three components (Weighted N=805 K). (2) Standard errors are in parentheses. SOURCE: National Center for Education Statistics: High School and Beyond/Sophomore cohort, NCES CD#98-135. (Adapted from Adelman, 1999, p. 85.)

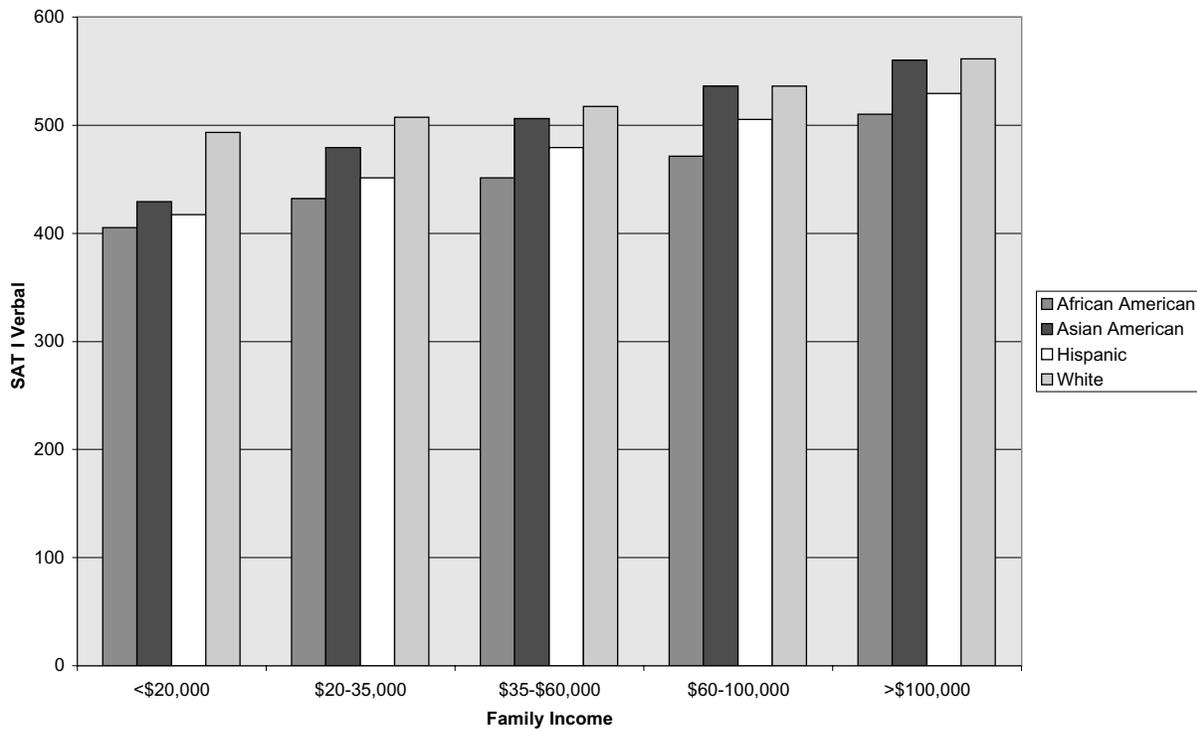


Figure A1. Mean SAT I verbal score for ethnic and racial groups by family income.

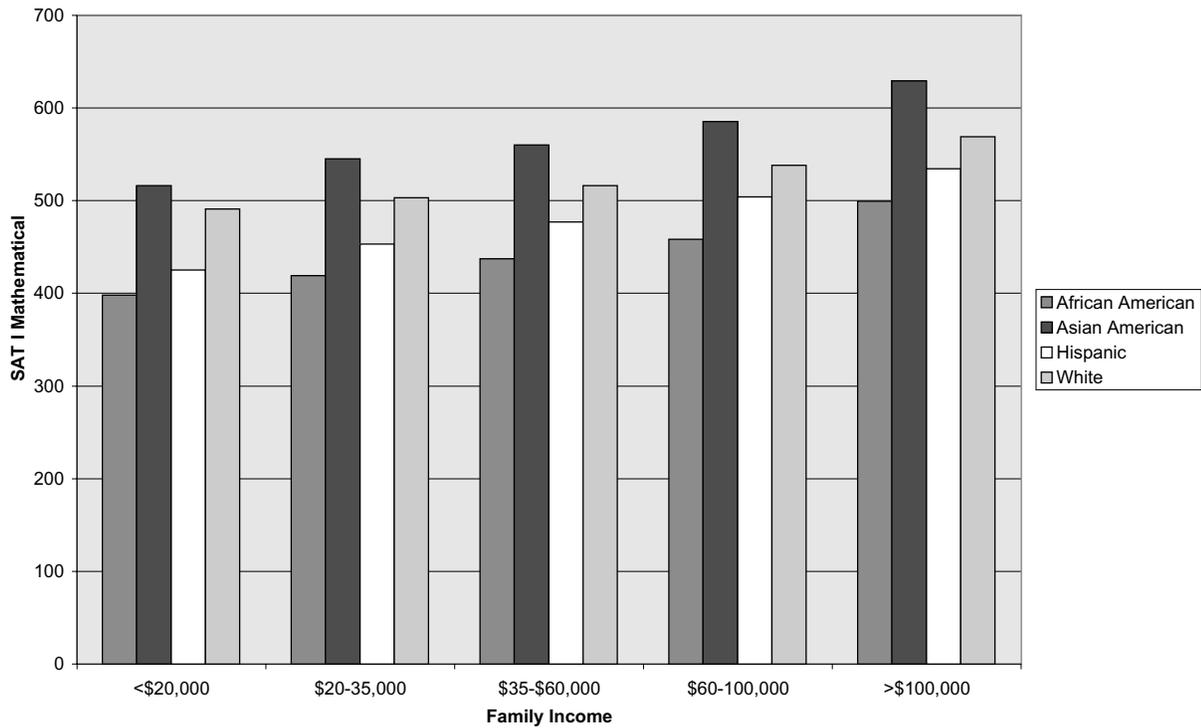


Figure A2. Mean SAT I math score for ethnic and racial groups by family income.

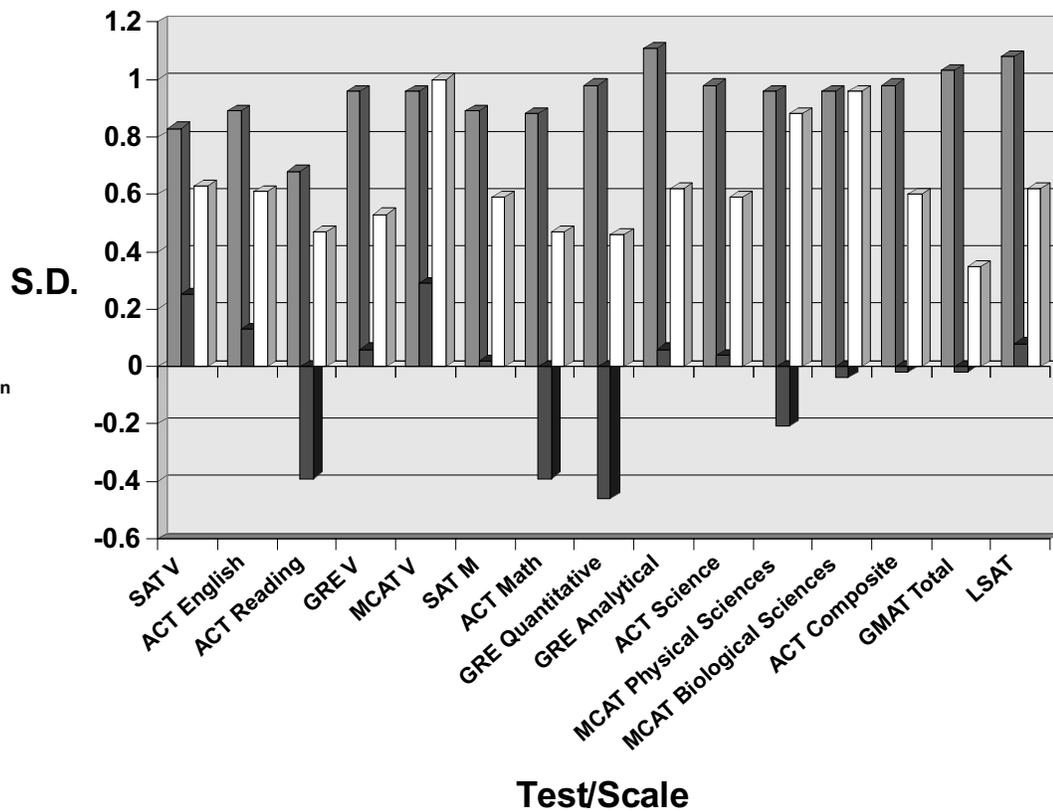


Figure A3. Standardized differences for admission and professional tests.